

No. 10.—*Revision of the Afro-Oriental Geckos of the Genus Phelsuma*

BY ARTHUR LOVERIDGE

Not since Boulenger (1885d, p. 209) monographed this genus fifty-six years ago has any revision been attempted. At that time 8 species were recognized, the same number as Mocquard (1909, p. 19) included in his key to the Malagasy species a quarter-of-a-century later. Rendahl (1939a, p. 263), in connection with a report on a collection from the Seychelles, gave a resumé of 13 species and described 6 more, of which unfortunately I can recognize but two. Dr. Rendahl was severely handicapped by the very scanty comparative material at his disposal.

In this respect the Museum of Comparative Zoölogy, with 17 of the 23 species now recognized, is more fortunately placed. This is largely due to the energetic and far-sighted policy of Dr. Thomas Barbour who assembled them over a period of years. It is with particular appropriateness and pleasure, therefore, that I associate his name with the only novelty here described:

PHELSUMA BARBOURI spec. nov.

A paratype of this new species is in the American Museum of Natural History, whose entire *Phelsuma* collection was generously placed at my disposal by Mr. C. M. Bogert. I have also to thank Dr. D. Cochran for submitting a species in the United States National Museum, and Mr. V. FitzSimons of the Transvaal Museum for answering questions regarding the type of *standingi*. Under present conditions it is not surprising that queries regarding certain species addressed to European museums have gone unanswered for the letters may not have reached their destinations.

One conclusion that must remain questionable is my action in referring *cepediana* to the synonymy of *inunguis* (*vide* pp. 7, 11). For many years half-a-dozen species were assigned to *cepediana* (1820) by the earlier herpetologists and resulted in much confusion, a confusion largely due to the homogeneous character of the lizards comprising this difficult genus.

In this connection it might be as well to point out the relative importance of the characters here employed for separation of species.

While snout length does assist in defining certain groups, its value has been, and is, largely masked by the vagueness with which it was formerly expressed. Its usefulness will be fully established only when

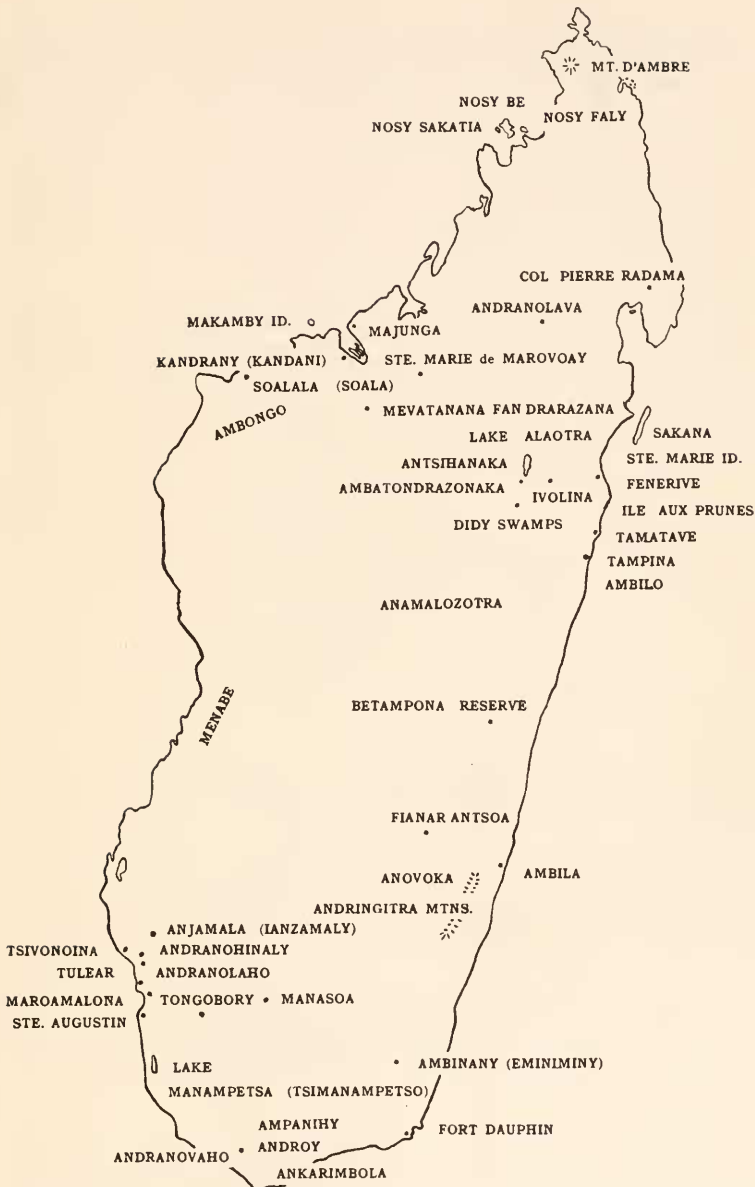
long series of age and sex of each species have been recorded. The presence, or absence, of a median cleft on the rostral is extraordinarily constant in several species of which good series are available; in others, however, it appears to be of little value. Apparently only in the Mauritius group of islands does one find the nostril bordered by the rostral and the centre of the nostril immediately above the suture between rostral and first labial. So far only two species (*mutabilis* and *breviceps*) have been recorded with less than the standard number of 3 nasals. While in a majority of species the normal number of inter-supranasal granules is 2, with 1 or 3 as less frequent variants, in several well-known species a single granule appears constant. The number of labials, whether upper or lower, appears of little consequence excepting for two species (*mutabilis* and *breviceps*) where reduction is correlated with a shortening of the snout.

Boulenger (1885d) sometimes designated the dorsals "granular scales;" as I have been unable to know where to draw the line between those species where such a term is reasonably applicable and those species where "granules" is more appropriate, I have used the shorter term throughout. It is interesting to note that the ventral scales are smooth in all species except *trilineata*, *lineata*, *bimaculata*, *quadriocellata* and *astriata*, and in some of these so obtusely as to be scarcely noticeable at times. The number of subdigital lamellae of the fourth toe serves only to differentiate the two species *mutabilis* and *breviceps*. The subuniform or transversely dilated character of the subcaudals appears to me to offer the most important indication of relationships which we have, so that it is unfortunate that it was not employed by Rendahl when describing *sundbergi* and other forms from the Seychelles.

As a result of these studies several species have had to be referred to the synonymy, viz.

<i>Gecko cepedianus</i> Merrem	= ? <i>P. inunguis</i> (Cuvier)
<i>Phelsumia lineata</i> var. <i>bifasciata</i> Boettger	= <i>P. lineata</i> Gray
<i>Phelsuma carinatum</i> Rendahl	= <i>P. astriata</i> Tornier
<i>Phelsuma carinatum</i> <i>maheense</i> Rendahl	= <i>P. astriata</i> Tornier
<i>Phelsumia laticauda</i> var. <i>comorensis</i> Boettger	becomes <i>P. dubia</i> <i>comorensis</i> Boettger
<i>Phelsuma pulchrum</i> Rendahl	= <i>P. m. longinsulae</i> Rendahl
<i>Phelsuma pulchrum</i> <i>cousinense</i> Rendahl	= <i>P. m. longinsulae</i> Rendahl
<i>Phelsumia micropholis</i> Boettger	= <i>P. mutabilis</i> (Grandidier)

In Madagascar there appears to be a fairly well-marked division as between those species found in the drier west and those occupying the



Map of Madagascar showing approximate position of all localities in which *Phelsuma* have been collected

mountainous and more humid east, though towards the extreme north and south such a division tends to disappear. In view of the difficulties I have encountered in locating many Malagasy places, largely owing to the haphazard way in which prefixes and suffixes are attached to root names, a map is furnished showing the approximate positions of localities as located on the best map known to me, that of G. Grandidier and J. Hanson (1925, Pub. by Soc. d'Edit. Geog. Marit, et Coloniales).

The spellings on that map are accepted and those of herpetologists placed in parentheses, except for the following:

Andranohinaly (Boettger), though probably ANDRANOHINALAHY (of the map). Andranovaho (Angel) though quite possibly ANDRANO-MAVO (of the map). *Angurutani (Boettger) of Northwest Madagascar, which I failed to find. Ankarimbola (Ankarimbela: Boettger) given as KARIMBOLA (on the map). Col Pierre Radama (Mertens) not found unless COL AMBATONDRADAMA (of map). *Fierin (Grandidier, 1869) though probably FIRINGA, S. W. Mad. (of map). *Tanosy (Kaudern) not found, though obviously near Manasoa and Tulear. Tsianovoka (Angel; Anevoka: Boettger) not found though S.S.W. of Fort Carnot and Mt. Ikongo in eastern Madagascar.

Genus PHELSUMA¹

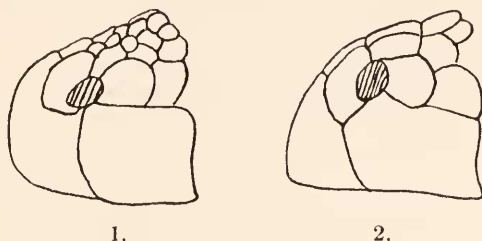
1825. *Phelsuma* Gray, Ann. Philos., **26**, p. 199 (type *Gecko cepedianus* Merrem).
 1830. *Anoplopus* Wagler, Nat. Syst. Amphib., p. 142 (type *Gecko cepedianus* Merrem).

Digits clawless or with a vestigial claw, not webbed, thumb and inner toe vestigial and not dilated, remaining digits subcylindrical at base, below covered by scales which distally are replaced by transversely dilated shields merging into the undivided transverse lamellae of the strongly dilated discoid apex, which is without free terminal phalange. Body more or less depressed, dorsal lepidosis of juxtaposed, subuniform granules, below with smooth, subhexagonal, imbricate scales; tail also depressed, covered above with granules, below with larger imbricate scales. Pupil round; eyelid distinct all round the eye. Males with preano-femoral pores forming an uninterrupted series; both sexes with a pair of small, transverse, post-anal slits.

* Omitted from map accompanying this paper on account of failure to locate.

¹ Boettger (1913) emended the spelling to *Phelsumia*, but this seems undesirable. Though named for van Phelsum, the noun has a feminine ending which makes it advisable to have all the adjectival specific names in agreement.

Range. Coast of Tanganyika Territory¹ and islands of the Indian Ocean (Zanzibar; Pemba; Seychelle; Amirante; Aldabra; Comoro; Madagascar; Mauritius; Andaman, etc.).



1. 2.
Showing relative position of nostril in
1. *P. inunguis*. 2. *P. madagascariensis*.
(After Rendahl)

Key to the Species

- I. Subcaudals subequal, the median series not strongly transversely enlarged
- A. Centre of nostril immediately above the suture between first labial and rostral (see fig. 1).
1. Ventral scales smooth.
- Upper labials 8; lower labials 7; preano-femoral pores in males 12; range: Rodriguez Island, near Mauritius. *newtoni*
(p. 446)
- Upper labials 8-10; lower labials 6-8; preano-femoral pores in males 14-25; range: Réunion Island and Mauritius
inunguis
(p. 448)
- Upper labials 11-14; lower labials 9-10; preano-femoral pores in males 45-46; range: Round Island, near Mauritius.
guentheri
(p. 449)
2. Ventral scales keeled.
- Said to agree with *inunguis* (= *cepediana*) in all other respects except that dorsally the caudal verticils are composed of 7 (instead of 8-11) scales; range: said to have come from Madagascar. *trilineata*
(p. 450)

¹Boulenger (1885d, p. 214) records two young geckos from Quilimane, Mozambique as "probably introduced"; received from Sir John Kirk.

B. Centre of nostril immediately above the first labial (see fig. 2).

1. Ventral scales keeled, even though feebly.

- a. Dorsal, or at least lumbar, granules keeled, even though indistinctly.

A dark lateral line but no oval patch or ocelli in dorsolateral region; range: eastern Madagascar *lineata*
(p. 451)

A large vertically oval black patch above and behind fore limb only; range: eastern Madagascar *bimaculata*¹
(p. 453)

A large ocellus behind fore limb and another before hind limb; range: southcentral Madagascar *quadriocellata*
(p. 454)

- b. Dorsal and lumbar granules entirely smooth.

An orange-brown vertebral line flanked by a series of large orange-brown blotches; range: Seychelle Islands . . . *astriata*
(p. 455)

2. Ventral scales smooth.

- a. Posterior chin shields and lateral chest scales weakly keeled.

Dark green dorsal coloring merges on flanks into whitish belly without marmorations; size large—93 mm. from snout to anus; range: Praslin Island, Seychelle Islands
*sundbergi*²
(p. 456)

- b. Posterior chin shields and lateral chest scales as smooth as the ventrals.

- i. Rostral with median cleft above.

- (a) Dorsal granules entirely smooth.
- ³

Dorsal pattern of dark longitudinal lines; inter-supranasal granules 1; upper labials 6–9; lower labials 6; range: eastern Madagascar *barbouri* sp. n.
(p. 457)

Dorsal pattern of dark cross bars; inter-supranasal granules 2; upper labials 9; lower labials 7; range: south-western Madagascar *standingi*
(p. 459)

- (b). Dorsal granules obtusely keeled.
- ³

Dorsal pattern, if any, of small orange-brown spots;

¹ Occurs with *lineata* from which it is possibly not distinct (Mertens), though more probably a synonym of *quadriocellata*, as suggested by Rendahl.

² As nothing is said of the condition of the subcaudals, their subequal condition is assumed, should they be transversely enlarged then *sundbergi* will become a race of *madagascariensis*.

³ Much care should be used in deciding.

inter-supranasal granules 2-3, rarely 1; upper labials 9-11; lower labials 8-10; range: northwestern Madagascar; Comoro Islands; Zanzibar and adjacent coast of Tanganyika Territory *d. dubia*
(p. 460)

ii. Rostral without median cleft above.

Dorsal and ventral coloring usually sharply separated by a dark lateral line or lines; chin as far back as third lower labial covered with shields of which the outer are much larger than the inner; range: Grand Comoro Island (? above 3000 feet) *d. comorensis*
(p. 463)

Dorsal and ventral coloring intermingling on flank; chin as far back as the third lower labial covered with tile-like shields of which the outer are scarcely larger than the inner; range: Comoro Islands *v-nigra*
(p. 464)

II. Subcaudals with median series strongly transversely enlarged.

A. Snout 1.6 to 2 times as long as the distance between eye and ear-opening.

Back dark olive slate or brown, uniform or a narrow vertebral line flanked by purple streaks; range: Aldabra Islands *m. abbotti*
(p. 465)

Back green, uniform or spotted with reddish orange; range: Andaman Islands *m. andamanensis*
(p. 467)

Back green or purplish, a reddish orange vertebral line flanked by reddish orange blotches; range: Seychelle and Amirante Islands
m. longinsulae
(p. 466)

Back bluish gray or slate, uniform or finely vermiculate with black; range: Pemba Island *m. parkeri*
(p. 468)

Back bluish gray or purplish, uniform or spotted with reddish orange, such spotting often confined to lumbar region; range: Madagascar and adjacent islands *m. madagascariensis*
(p. 470)

B. Snout 1.3 to 1.6 times as long as the distance between eye and ear-opening.

1. Transverse lamellae + transverse shields beneath fourth toe 16-18; males with 24-26 (28 *vide* Boulenger) preano-femoral pores; lower labials 6-9.

Upper labials 6-9; outer row of enlarged chin shields bordered internally by smaller ones passing gradually into gular granules; tail much spotted; range: western Madagascar and

adjacent islands (Nosy Be; Nosy Faly), Comoro Islands (Anjouan; Mayotte) and Farquhar *laticauda*
(p. 472)

Upper labials 8-11; 6-10 enlarged chin shields surround a group of small scales; gular chevrons extend as parallel lines to side of neck; range: northeastern Madagascar . . . *guttata*
(p. 474)

2. Transverse lamellae + transverse shields beneath fourth toe 10-12; males with 27-32 preano-femoral pores; lower labials 5-6. Outer row of chin shields (consisting of 3-4 pairs) bordered posteriorly by smaller ones passing gradually into gular granules; range: Madagascar (chiefly southwest and south but recently recorded from the northeast) *mutabilis*
(p. 475)

Outer row of chin shields (consisting of only 2 pairs) bordered posteriorly and abruptly by minute granules (possibly not distinct from *mutabilis* or records confused); range: southern Madagascar *breviceps*
(p. 477)

PHELSUMA NEWTONII Boulenger

1884c. *Phelsuma newtonii* Boulenger, Proc. Zool. Soc. London, p. 2: Rodriguez Island, near Mauritius.

1885d. Boulenger, p. 212, pl. xvii.

1917g. Chabanaud, p. 442.

Description. Snout 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter less than half that of the former; rostral with median cleft above; centre of nostril above the suture between rostral and first labial; the uppermost nasal separated from its fellow by 3 granules; upper labials 8; lower labials 7; only an inner pair of chin shields well differentiated from the gulars.

Back covered with smooth granules; ventral scales smooth; males with 12 preano-femoral pores forming an uninterrupted series; tail, when unregenerate, covered above with smooth scales, below with smooth, imbricate, subuniform scales.

Coloration. Above, blackish olive. Below, bluish gray; lips and throat sometimes whitish.

Measurements. Total length of cotype ♂, 223 (105 + 118) mm.

Remarks. No examples seen as known only from the two cotype males in the British Museum and a pair in the Paris Museum. The digits are said to be shorter than in other species.

Range. Rodriguez Island, near Mauritius.

¹Statistical Synopsis of Variation in the Genus *Phelsuma*

SPECIES	Centre of nostril above (1) rostral-labial suture (2) labial	Nostril between first labial and . . .	Number of inter-supra-nasal granules	Upper labial range of . . .	Lower labial range of . . .	Lamellae beneath fourth toe	Range of preano-femoral pores in males
<i>newtoni</i>	suture	rostral + 3 nasals	3	8	7		12
<i>inunguis</i> *	"	"	2-3	8-10	6-8	17-18	14-25
<i>guentheri</i>	"	"		11-14	9-10		45-46
<i>trilineata</i>	"	"					
<i>lineata</i> *	labial	3 nasals	1-2	7-10	6-8	15-19	24-30
<i>bimaculata</i>	"	" only	1	8-9	7-9		27
<i>quadriocellata</i> *	"	"	1-2	9-10	7-9	16-17	27-29
<i>astriata</i> *	"	"	1-2-3	8-11	7-8	15-17	27-30
<i>sundbergi</i>	"	"	1-2-3	8-11	6-9		27-36
<i>barbouri</i> sp. n.*	"	"	1	6-9	6	16	?
<i>standingi</i>	"	"	2	9	7		?
<i>d. dubia</i> *	"	" 2	1-2-3	9-12	8-10	15-17	22-29
<i>d. comorensis</i> *	"	"	1	7-9	6-8	15-16	12-17
<i>v-nigra</i> *	"	"	1	7-8	6-8	15-19	20-28
<i>m. abbotti</i> *	"	"	1-2-3	7-8	7-7	18	33-34
<i>m. andamanensis</i> *	"	"	2-3	8-11	6-10	15-16	24-32
<i>m. longinsulae</i> *	"	"	1-2-3	9-11	7-9	17-18	28-35
<i>m. parkeri</i> *	"	"	1 (2)	8-10	7-9	16-17	32-38
<i>m. madagascariensis</i> *	"	"	1	7-10	6-9	16-19	34-50
<i>laticauda</i> *	"	"	1	6-9	6-9	16-18	20-28
<i>guttata</i>	"	"	2	8-11	6-9		
<i>mutabilis</i> *	"	2-3 nasals	1-2-3	6-8	5-6	10-12	27-32
<i>breviceps</i> *	"	2 nasals	1	6-7	5-6	11	27-31

¹ Naturally many of these ranges will be extended when more material is available of those species of which only one or two examples are known at the present time.

² Two in a Bagamoyo lizard only.

* Represented in the collections of the Museum of Comparative Zoölogy, examples of those species without asterisk are earnestly desired.

PHELSUMA INUNGUIS (Cuvier)

1817. *Gecko inunguis* Cuvier, Règne Animal, ed. 1, 2, p. 46, pl. v, fig. 3: Isle de France, i.e. Mauritius.
1817. *Gecko cépédien* (Peron) Cuvier, Règne Animal, ed. 1, 2, p. 46, pl. v, fig. 5: Isle de France.
1820. *Gecko cepedianus* Merrem, Vers. Syst. Amphibien, p. 43: Mauritius.
1825. *Phelsuma crepidanus* (sic) Gray, p. 199.
1827. *Phelsuma ornatum* Gray, in King, Narrative Survey inter. west. Coasts Australia . . . 1818 and 1822, App., p. 428: Mauritius.
- 1831b. Gray, p. 48.
- 1831b. *Phelsuma Inunguis* Gray, p. 47.
- 1831b. *Phelsuma Cepedianus* Gray, p. 47.
1845. Gray, p. 166.
1833. *Platydictylus cepedianus* Geoffroy, Cl. III, pl. iii.
1836. Duméril & Bibron, p. 301, pl. xxviii, fig. 2.
1843. *Anoplopus cepedeanus* Fitzinger, p. 99.
- 1877b. *Pachydictylus cepedianus* Peters (part), p. 455.
- 1881c. Boettger (part), p. 530.
- 1885d. *Phelsuma cepedianum* Boulenger, p. 211.
- 1885c. Müller (part), p. 296.
1887. Strauch (part), p. 17.
- 1890a. Müller, p. 290.
1909. Mocquard, pp. 19, 96.
- 1939a. Rendahl, p. 265, fig. 2a.

Further citations of '*cepedianus*' will be found under *guentheri*, *barbouri*, *d. dubia*, *m. longinsulae*, *m. madagascariensis*, and *laticauda*. Rochebrune's (1884a, Faune de la Senegambie. Reptiles, p. 74) record from Senegambia is ignored. Duméril and Bibron's synonymy is misleading as they have latinized many vernacular citations until they bear little resemblance to the original.

Description. Snout 1.7 to 2 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter ¹seven-eighths that of the former; rostral with median cleft above; centre of nostril above the suture between rostral and first labial; nostril between rostral (sometimes barely), first labial (sometimes excluded) and 3 nasals, the uppermost separated from its fellow by 2-3 granules; upper labials 8-10; lower labials 6-8; chin region covered with enlarged scales of which the outer are larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; males with 14-25 preano-femoral pores forming an uninterrupted series;

¹ Half *vide* Boulenger (1885d).

about 17-18 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales, subuniform, or the two median series somewhat enlarged.

Coloration. Above, bluish or purplish with reddish markings, viz. a variously-shaped interocular mark, snout with, or without, a \cap -shaped band whose arms extend to the eyes and may continue on to the shoulder or even along the flanks, occiput and nape with two or three longitudinal stripes, back and tail irregularly spotted. Below, whitish, the throat sometimes grayish but not spotted.

Measurements. Total length of ♂, 151 (68 + 83) mm., from Reunion Island (M.C.Z. 2165).

Remarks. *Gecko inunguis* was placed with a query in the synonymy of *Pachydactylus ocellatus* by Boulenger, a name usually applied to a South African gecko now known as *P. geitje* (Sparrmann, 1778). It seems to me, however, from Cuvier's figure and locality that it was the poreless female of the male lizard which he called cépédien, a name given to it in Peron's manuscript. Under any circumstances Cuvier is not the author for cépédien was first latinized by Merrem. The question of specific identity as between *inunguis* and *cepediana* can be settled only by a careful examination of the types in the Paris Museum, bearing in mind the extreme variability in pattern, particularly as between young and old of this Mauritian gecko.

Habits. Peters (part, 1877b) states that these geckos occur in forests and gardens where their hard-shelled eggs may be found adhering to leaves. He attributes to them a uniformly high, not unpleasant note which may be heard in the evening and at night. Both statements require verification for most geckos select a more stable foundation—such as crevices in a tree trunk—to which to attach their eggs.

Range. Mauritius and Réunion Islands (Formerly known as *Iles des France et Bourbon*).

PHELSUMA GUENTHERI Boulenger

1873. *Platydictylus cepediana* Pike (not Merrem), p. 161.

1885c. *Phelsuma cepedianum* Müller (part), p. 296 ("Mauritius").

1885d. *Phelsuma guentheri* Boulenger, *Cat. Lizards Brit. Mus.*, 1, p. 213:
Round Island, near Mauritius

1887. Strauch, p. 17.

1890a. Müller, p. 289.

Description. Snout nearly 2 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about a

third that of the former; rostral with median cleft above; centre of nostril above the suture between rostral and first labial; upper labials 11-14; lower labials 9-10; chin region covered with enlarged scales of which the outer are slightly smaller than the inner, and well differentiated from the minute gulars.

Back covered with smooth granules; ventral scales smooth; males with 45-46 preano-femoral pores forming an uninterrupted series; tail, when unregenerate, covered above with smooth scales, below with smooth, imbricate, subuniform scales.

Coloration. Above, gray, uniform (♀), or head sparsely spotted with black (♂) and with two subparallel black streaks from eye towards neck where they may terminate or continue on across nape to unite with their fellows from the other side to form two chevron-like markings. Below, whitish, throat marked with gray (Strauch).

Measurements. Total length of a cotype, 223 (125 + 98) mm., but surpassed by a ♂, with a total length of 240 mm. (Strauch).

Remarks. Below I give verbatim Pike's description of this lizard as contained in the chapter dealing with his first visit to the almost inaccessible Round Island which concludes with the statement: "I believe this lizard is as yet undescribed." Apparently these notes deal with the types listed by Boulenger as received from Günther. The last sentence of paragraph 3 in Pike's account would appear to have been added at a later date to his journal-account, perhaps on hearing from Günther, but this is purely speculative, it reads: "The lizard is the same as the one so common in Mauritius (*Platydictylus cepedianus*)," and should apparently have been added to the previous paragraph.

Habits. "An active little creature found in the steep rocks on the mountain side. It is about 6" in length and deposits from 6 to 12 white eggs, the size of an ounce musket ball, in a row on the branches of the *Latania glaucophylla*, which are so firmly glued to the bark that they could not be detached without breaking." (Pike). That all the eggs were laid by one gecko is, of course, a mistake.

Range. Round Island, about 25 miles from Mauritius.¹

PHELSUMA TRILINEATA Gray

1842. *Phelsuma trilineatum* Gray, Zool. Misc., p. 57: No locality given, later stated by Boulenger to be Madagascar.
 1885d. Boulenger, p. 212.
 1909. Mocquard, pp. 19, 93.
 1845. *Phelsuma lineatum* Gray (part), p. 166.

¹ Müller and Strauch's four specimens are labeled Mauritius only, and may be misidentified *inunguis*.

Description. Ventrals keeled, though less strongly than in *lineata*, while dorsally a caudal verticil consists of 7 scales. Otherwise, according to Boulenger, it agrees with *cepediana* (i.e. *imunguis*) in every respect. Known only from the type, allegedly from Madagascar, and a second specimen which is without locality, both in the British Museum, and neither of which I have seen.

Coloration. Above, olive black; forehead with a triangular orange spot; a broad streak from nostril through ear to fore limb; three narrow lines and two rows of oblong orange spots. (Gray).

Range. Said to be Madagascar.

PHELSUMA LINEATA Gray

1842. *Phelsuma lineatum*¹ Gray, Zool. Misc., p. 57: Madagascar.
 1845. Gray, p. 166.
 1885d. Boulenger, p. 216.
 1885a. Müller, p. 163.
 1887a. Boulenger, p. 490.
 1887. Strauch, p. 18.
 1893a. Boettger, p. 39.
 1901. Schenkel, p. 182.
 1901b. Tornier (part), p. 64.
 1903b. Ferreira, p. 22.
 1909. Mocquard, pp. 20, 92, 93.
 1913. Boettger (as *Phelsumia*), pp. 294, 322, 328.
 1913a. Methuen & Hewitt, p. 187.
 1918. Barbour, p. 482.
 1922. Kaudern, p. 420.
 1925b. Angel, p. 60.
 1931d. Angel, p. 515.
 1933b. Mertens (part), p. 265.
 1934a. Angel, p. 312.
 1939a. Rendahl, p. 270.
 1880a. *Pachydactylus laticauda* Boettger (part), p. 280 (Tamatave only).
 1881c. Boettger (part), pp. 461, 530 (Tamatave only).
 1881c. *Pachydactylus lineatus* Boettger, p. 530.
 1893a. *Phelsuma laticauda* Boettger (part), p. 39 (Tamatave only).
 1918. Barbour, p. 482.
 1913. *Phelsumia lineata* var. *bifasciata* Boettger, in Voeltzkow, Reise in Ostafrika, 3, p. 294: Ankarimbela, i.e. Ankarimbola, southcentral Madagascar.
 1936c. ?*Phelsuma dubium* Angel² (? not Boettger), p. 126 (Tsianovoka).

¹ Some of the references following are to *lineatus* and *lineata*.

² Based on a young gecko; tentatively placed here as being the only record of *dubia* from the east coast, whereas *P. lineata* has been recorded from Anovoka by Boettger (1913).

Further citations of 'lineata' will be found under *trilineata*, *carinata*, and *bimaculata*.

Description. Snout 1.3 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral without, rarely with, a median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-2 granules; upper labials 7-10; lower labials 6-8; chin region covered with enlarged scales of which the outer are slightly larger than the inner, the latter posteriorly merging into the gulars.

Back covered with strongly, or obtusely, keeled granules; ventral scales keeled, though often very feebly; males with 24-30 preanofemoral pores forming an uninterrupted series; about 15-19 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with keeled scales, below with keeled, imbricate, sub-uniform scales.

Coloration. Above, brownish or purplish; snout sometimes with a dark, trident-like marking; a dark streak from nostril through eye and ear along flank and tail, sharply defining the dorsal coloring from the ventral; back blotched or variegated with lighter posteriorly; limbs and tail marbled with black. Below, whitish; a dusky violet \cap -shaped mark following contour of lower jaw to insertion of forearm, sometimes extending on along the flank, thereby separating a light lateral line (*bimaculata*), to hind limb; tail immaculate or flecked with darker.

Measurements. Total length of ♂, 105 (53 + 52) mm., from Madagascar (U.S.N.M. 23427), and of ♀, 108 (52 + 56) mm., from between Tamatave and Tananarivo (M.C.Z. 11719).

Remarks. Boettger (1881c) assigned to the synonymy Duméril & Bibron's (1836, p.298) *Pachydaetylus ocellatus* on account of their statement as to its probable occurrence in Mauritius, though a re-examination of the type of *Gecko ocellatus* may yet demonstrate it to be a *Phelsuma* it will not be found referable to *lineata*.

Boulenger (1887a), after examination of the types, referred *quadriocellata* to the synonymy of *lineata*. Though it must be confessed that the lepidosis is closely similar I am confident that they are distinct, perhaps, as suggested by Mertens (1933b), subspecifically, but no definite locality has yet been recorded for *quadriocellata*.

Boettger (1913) separated *bifasciata*, of which the Museum of Comparative Zoölogy has a cotype (M.C.Z. 21950), on the grounds that

it usually has 2 granules between the anterior nasals whereas *lineata* usually has 1, yet Boettger later says that of the 11 cotypes which he has examined 6 have 2 granules and 5 have only 1! The only other differences cited are the allegedly less well defined caudal verticils, a character which appears variable in most species of the genus, and the presence of a second longitudinal stripe on the flank. Yet in our cotype the stripe does not extend behind the fore arm and appears to be represented in varying degrees of indistinctness in our extensive material from other localities.

Localities. Madagascar: Alaotra; Ambatondrazonaka; Ambila; Ambilo; Ambinany (? Eminiminy); Anamalozotra; Ankarimbola (Ankarimbela); Anovoka (Anevoka; Tsianovoka); Antsihanaka; Betampona Reserve; (Eminiminy, see Ambinany); Didy Swamps; Fandrarezana; Fenerive; Fianarantsoa; Ile aux Prunes; Ivoloina; (Majunga¹); Sakana; Ste. Marie Id. Tamatave; Tamatave to Tananarivo; Tampina.

Mertens (1933b) record from Col Pierre Radama is removed to *bimaculata* until the status of that form is definitely settled.

Range. Eastern¹ Madagascar.

PHELSUMA BIMACULATA Kaudern

1922. *Phelsuma bimaculata* Kaudern, Zool. Jahrb. Syst., 45, p. 420, pl. xii, fig. 2; Fandrarezana, eastern Madagascar.

1939a. Rendahl, p. 270.

1933b. *Phelsuma lineata* Mertens (part), p. 265.

Description. Snout (1.6 to) 2 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral with, rarely without, median cleft above; centre of nostril above first labial; the uppermost nasal separated from its fellow by 1 granule; upper labials 8-9 (11); lower labials (6) 7-9. Back covered with slightly keeled granules; ventral scales strongly keeled; males with 27 (24-28) preano-femoral pores forming an uninterrupted series; tail, when unregenerate, covered above with keeled scales.

Coloration. Above, bluish or reddish violet flecked with golden yellow; above and behind fore limb is a large, vertically oval black blotch (but no lateral line as is found in *lineata*); limbs slightly mottled; tail punctate with black dorsally and with an indistinct, longitudinal,

¹Boettger's (1893a, 1913) record of Majunga, being the only one from the northwest should be received with reserve, the possibility of erroneous locality data not being overlooked.

black line laterally. Below, whitish, a dusky violet \cap -shaped mark following contour of lower jaw to insertion of fore limb; tail immaculate.

Rendahl (1939a) says that Kaudern overlooked a faint second blotch anterior to hind limb in the types. Kaudern is mistaken in thinking that the underside of the tail in all *lineata* are punctate, some of our numerous specimens have tails which are immaculate beneath.

Measurements. Total length of cotype ♂, 85 (43.5 + 42.5) mm., of cotype ♀, 89 (43.5 + 45.5) mm., but tails of both partly or wholly regenerated.

Remarks. Mertens (1933b), who had nine geckos from Col Pierre Radama which agreed with the figure and description of *bimaculata*, is inclined to think that it is but a color variant of *lineata* for the latter species was taken in the same locality. Kaudern also referred to *lineata* six geckos which he took at Fandrarazana, the type locality of *bimaculata*.

Rendahl (1939a) compared the types of *bimaculata* with six geckos, taken in southeast Madagascar between the tableland and coast, and declared them to be the same though his specimens exhibited four blotches as in *quadriocellata*, a species with which he thought *bimaculata* might prove to be synonymous, a conclusion which is probably correct. In view, however, of the possibility that they are subspecifically distinct, and that his material from the southeast should rather be referred to *quadriocellata* of southcentral Madagascar than to *bimaculata* of northeastern Madagascar, any additional data derived from Rendahl's six specimens is incorporated in the above description in parentheses.

Localities. **Madagascar:** Col. Pierre Radama; Fandrarazana.

Range. Eastern Madagascar.

PHELSUMA QUADRIOCELLATA (Peters)

1883b. *Pachydactylus quadriocellatus* Peters, Sitz. Ges. Naturf. Freunde Berlin, p. 28; Madagascar.

1885d. *Phelsuma quadriocellatus* Boulenger, p. 216.

1909. *Phelsuma quadriocellatum* Mocquard, pp. 20, 98.

Description. Snout 1.5 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral without median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-2 granules; upper labials 9-10; lower labials 7-9; chin region covered with enlarged scales of which the

outer are but slightly larger than the inner, the latter posteriorly merging into the gulars.

Back covered with almost smooth granules; ventral scales keeled; males with 27-29 preano-femoral pores forming an uninterrupted series; about 16-17 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth (distally) and keeled (basically) imbricate, subuniform scales.

Coloration. Above, emerald green, more or less uniform or flecked with darker; head and neck spotted with pale blue; behind the fore limb is a black spot edged with pale blue, a similar spot in front of the hind limb; on the flanks the dorsal pigmentation darkens along its lower edge (as in *lineata*). Below, whitish (yellowish), a dusky violet α -shaped mark following contour of lower jaw to insertion of fore limb, sometimes extending on along the flank to hind limb. Iris golden yellow.

Measurements. Total length of ♂, 88 (42 + 46) mm.; of ♀, 80 (38 + 42) mm. (M.C.Z. 7734).

Remarks. Despite its close relationship to *lineata* and the probability that the ocelli are derived from a dark lateral line, I cannot help but think, from examination of the pair in the Museum of Comparative Zoölogy, that this rare lizard is distinct; possibly, as suggested by Mertens (1933b), it may ultimately prove to be a geographical form when we know something of its distribution.

Range. Central Madagascar.

PHELSUMA ASTRIATA Tornier

1901b. *Phelsuma lineata* var. *astriata*, Tornier, Zool. Anz., **24**, p. 65: Mahe Island, Seychelle Islands.

1939a. *Phelsuma carinatum* Rendahl, Zool. Jahrb. Syst., **72**, p. 277: Praslin Island, Seychelle Islands.

1939a. *Phelsuma carinatum maheense* Rendahl, Zool. Jahrb. Syst., **72**, p. 278: Port Victoria, Mahe Island, Seychelle Islands.

Description. Snout 1.8 to 2.1 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-3 granules; upper labials 8-11; lower labials 7-8; chin region covered with enlarged scales of which the outer are larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales keeled; males with 27-30 preano-femoral pores forming an uninterrupted series; about 15-17 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered with smooth scales, below with keeled, imbricate, subuniform scales (in reproduced tails sometimes transversely enlarged, sometimes not).

Coloration. Above, blue violet; a brownish-orange streak from nostril to eye; a \cap -shaped mark in frontal region; back with a vertebral line (sometimes broken up) flanked by more or less coalescing spots; flanks with another series; limbs variegated with lighter; tail spotted or cross-banded with lighter. Below, whitish, a dusky violet \cap -shaped mark following contour of lower jaw; breast, belly, and tail immaculate.

The coloring closely resembles that of *P. m. longinsulae*, also of the Seychelles. It is interesting to note that Rendahl says of *carinatum* that the coloring resembles that of *sundbergi* but vertebral stripe is darker and the red markings larger, while of *maheense* he remarks that it resembles *carinatum* except for the more distinct gray vertebral stripe.

Measurements. Total length of σ , 123 (57+66) mm. (M.C.Z. 46146), largest cotype of *carinatum* 56 mm. from snout to vent; of *maheense* 55.5 mm.; tails of both being damaged.

Remarks. No characters or key for distinguishing *carinatum* and *maheense* are furnished by Rendahl who apparently overlooked Tornier's *astriata*, buried in the text under the heading *Phelsuma lineata*.

Localities. **Seychelle Islands:** Bel Air, near Port Victoria, Mahe Id.; Praslin Id.

Range. Seychelle Islands.

PHELSUMA SUNDBERGI Rendahl

1939a. *Phelsuma sundbergi* Rendahl, Zool. Jahrb. Syst., **72**, pp. 274, 318, figs. 3-5, 16; Praslin Island, Seychelle Islands.

Description. Snout about 2.1 times as long as the distance between the eye and the ear-opening; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-3 granules; upper labials 8-11; lower labials 6-9. Posterior chin shields and lateral scales of chest weakly keeled; ventral scales smooth; males with 27-36 preano-femoral pores forming an uninterrupted series.

Coloration. Above, dark green (almost emerald green in life); a reddish streak from nostril to eye present or absent; a \cap -shaped mark on frontal region; on flanks the dark dorsal coloring merges into the lighter coloring of the belly without marmorations; limbs uniform (weakly marbled in life). Below, whitish; a dusky \cap -shaped mark following contour of lower jaw present or absent; throat of young uniform or shaded with gray, of adults with dusky flecking. Tongue red.

Measurements. Total length of largest cotype, 178 (93.5+84.5) mm.

Remarks. As nothing is said about the subcaudal arrangement, the present action in placing *sundbergi* in the group of those having subuniform subcaudals is arbitrary and based on Rendahl's action in placing it before "*carinatum*." Should the subcaudals have the median series transversely enlarged, *sundbergi* will undoubtedly prove to be a race of *mascareniensis* (which has been recorded from Praslin Id. by other authors) possibly peculiar to Praslin where the keeling on posterior chin shields and breast may have developed as a secondary sexual character for one notes that no fewer than 17 of the 24 cotypes are males. Had it not been for Rendahl's mentioning young specimens in his color description I should have been tempted to suggest uniting *sundbergi* with *longinsulae* (the former having page precedence) whose head markings it is said to resemble.

Diet. In captivity, flies, cockroaches, and mealworms (Rendahl).

Habits. In captivity these geckos were eager to take up drops of water with their tongues. Though diurnal, they avoided direct sunlight and sought out shady corners, preferring the glass sides of their vivarium to the twigs and branches which had been supplied them. Occasionally one male might be seen chasing another but at no time was any sound heard from them. As the sloughing period approached, the geckos' movements became perceptibly slower and a striking change from the normal bright green coloring to dusky blackish green took place. As the old skin loosened it was removed and eaten by the gecko. After a year in captivity a skin disease made its appearance among them, it was characterized by black spots and wasting of the tail, which would finally fall off. Assuming it to be a deficiency disease, Vigantol on sugar was supplied with some success, for the last geckos to succumb were not victims of the disease.

Range. Praslin Island, Seychelle Islands.

PHELSUMA BARBOURI spec. nov.

1918. *Phelesuma cepedianum* Barbour (not Merrem), p. 482.

Type. Museum of Comparative Zoölogy, No. 11640, a ♀ from forest between Tamatave and Tananarivo, eastern Madagascar, collected by F. R. Wulsin, 1915.

Paratypes. Museum of Comparative Zoölogy, No. 11641, a younger ♀ with same data as type; also American Museum of Natural History, No. 47897, an adult ♀ from Madagascar (precise locality label disintegrated by preservative), collected by the Archbold Franco-Anglo-American Expedition of 1929-1931.

Diagnosis. Closely related to *standingi* Methuen & Hewitt, of southwestern Madagascar, from which it differs in those characters indicated in the Key (p. 444) and to which it may be subspecifically related but the males of neither species are known.

Description. Snout 1.3 to 1.5 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about three-quarters that of the former; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1 granule; upper labials 6-9; lower labials 6; anterior pair of chin shields much larger than those immediately behind, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; (male unknown); about 16 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth, imbricate, subuniform scales.

Coloration. Above, brownish olive; a dark brown streak from nostril through eye and ear-opening to flank anteriorly; another streak from supraocular region continuing as a dorsolateral line to about midbody where it breaks up or continues indistinctly to base of tail; two brown streaks from snout to occiput where they coalesce to form a single line on nape only to break up into a series of dashes posteriorly, in fact on the dorsum there is a tendency for all these lines to disintegrate and form vermiculations; limbs almost uniform; tail uniform. Below, uniformly bluish gray except for an obsolescent, dusky, n-shaped mark following contour of lower jaw.

Measurements. Total length of type ♀, 99 + (59 + 40 +) mm., the tip being regenerated, surpassed in length from snout to anus by a paratype ♀ (A.M.N.H. 47897) of 64 mm.

Remarks. At the time these two specimens were received the genus

was but poorly represented in the collection of the Museum of Comparative Zoölogy with less than half the forms we have today.

PHELSUMA STANDINGI Methuen & Hewitt

- 1913a. *Phelsuma standingi* Methuen & Hewitt, Ann. Transvaal Mus. 3, p., 187: Forest fringing Onilahy River at Maroamalona, southwestern Madagascar.
1939a. Rendahl, p. 268.

Description. Snout 1.5 times as long as the distance between the eye and the ear-opening; rostral with median cleft above; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 2 granules; upper labials 9; lower labials 7; anterior pair of chin shields much larger than those immediately behind.

Back covered with smooth granules; ventral scales smooth; (male unknown); tail, when unregenerate, covered above with smooth scales, below with smooth, imbricate scales (of which the two median rows are enlarged, according to the authors).

Coloration. Above, emerald green, with numerous dark, irregular, transverse bars. Below, whitish, except for some bluish-gray flecking on throat; tail bluish.

Measurements. Total length of type ♀, 149+ (88 + 61+) mm., the tail being regenerated.

Remarks. Known to me only from the scanty description which should be augmented to the complete format furnished for other species. I am indebted to Mr. V. FitzSimons for confirming points in the description in which it differed from the preceding species.

Locality. **Madagascar:** Maroamalona.

Range. Southwestern Madagascar.

PHELSUMA DUBIA DUBIA (Boettger)

1854. *Platydictylus cepedianus* Peters (not Merrem), p. 615.
 1855. Peters, p. 44.
 1887. Vaillant, p. 134.
 1866b. *Pachydictylus cepedianus* Peters (not Merrem), p. 887.
 1869a. Peters (part), p. 13 (omit Nosy Be and Seychelles).
 1882a. Peters (part), p. 27.
 1881a. *Pachydictylus dubius* Boettger, Zool, Anz., 4, p. 46: Madagascar.
 1881c. Boettger, pp. 464, 530.
 1881g. Boettger, p. 179.
 1885d. *Phelsuma madagascariense* Boulenger (part), p. 214 (Zungomero).
 1885d. *Phelsuma dubius*¹ Boulenger, p. 215 (no material).
 1893a. Boettger, p. 38.
 1894e. Boulenger, p. 723.
 1902b. Tornier, p. 581.
 1909. Mocquard, pp. 20, 89.
 1913. Boettger², pp. 292, 327, 336, 339, 341, 343, pl. xxix, figs. 7-10.
 1913c. Nieden, p. 68.
 1917. Voeltzkow, p. 460.
 1922a. Mertens, p. 183.
 1931d. Angel, p. 515.
 1939a. Rendahl, p. 268.
 1940. Parker, Moreau & Pakenham, p. 309.
 1941. Moreau & Pakenham, 1940, p. 107.
 1900b. *Phelsuma laticauda* Tornier (not Boettger), p. 588.
 1913a. Methuen & Hewitt, p. 187.
 1920a. Loveridge, p. 139.
 1923d. Loveridge, p. 846.
 1924b. Loveridge, p. 9.
 1925a. Loveridge, p. 72.
 1928c. Barbour & Loveridge, p. 146.
 1933h. Loveridge, p. 295.
 1937f. Loveridge, p. 492.
 1903b. *Phelsuma cepedianum* Ferreira (not Merrem), p. 21.
 1917. Voeltzkow, p. 459.

Further citations of 'dubia' will be found under *lineata* and *laticauda*.

Native name. *Camantindi* (Anjouan Id.: Peters).

Description. Snout 1.3 to 1.6 times as long as the distance between the eye and the ear-opening; vertical diameter of the latter about three-quarters that of the former; rostral with³ median cleft above; centre of nostril above first labial; nostril between first labial and 2-3

¹ Some of the references following are to *dubium* and *dubia*.

² As *Phelsumia* (1913 only).

³ Dar es Salaam specimens allegedly without, not available for reexamination.

nasals¹, the uppermost separated from its fellow by 2-3, *very rarely* 1, granules; upper labials 9-12; lower labials 8-10; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with obtusely keeled² granules; ventral scales smooth; males with 19-29³ preano-femoral pores forming an uninterrupted series; about 15-17 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with obtusely keeled scales, below with smooth, imbricate, subuniform scales.

Coloration. Above, bluish gray to purplish brown, variegated and spotted with orange brown; on flank a dusky streak is present or absent; limbs vermiculated or spotted with black, gray, or bluish; tail sometimes bluish. Below, whitish, immaculate, or a dusky \cap -shaped mark following contour of lower jaw to shoulder.

In life (Dar es Salaam). Above, dark green, finely flecked with red on back and tail.

Judging by a hatchling (A.M.N.H. 147880), 21 mm. in length from snout to anus, the young are minutely speckled with brown-edged white spots which disappear by the time the gecko attains 23 or 24 mm. (A.M.N.H. 47881-2) in length.

From time to time Boettger has cited color differences allegedly distinguishing *dubia* from other species; these do not appear to hold good in series and should be accepted with reserve.

Measurements. Total length of ♂, 150 (65 + 85) mm., from Zanzibar (M.C.Z. 19123); and of ♀, 133 (58 + 75) mm., from Madagascar (Boettger, 1913).

Remarks. The type of *dubia* was not available to Boettger when he (1881c) identified a specimen, allegedly from Nosy Be, as *dubia*. Later (1913) he denied the occurrence of *dubia* on Nosy Be 'as formerly supposed' though I am not clear whether it was the determination or the locality data which was at fault. Nosy Be is, however, omitted from the list of localities below.

In the latter paper (1913, p. 337) he gives a very fair summary of the characters distinguishing *dubia* from *laticauda*, though in stating that the two species agree in not having the median series of subcaudals enlarged, he errs, for of course *laticauda* has. At some time Boettger appears to have confused the type which he originally stated was in the Hamburg Museum and later referred to as being in

¹ Two is rare, in one Bagamoyo (M. C. Z. 24084) gecko only.

² Smooth, in the original description, was subsequently corrected.

³ 19-22 in Methuen & Hewitt's (1913a) series of "*laticauda*," vide FitzSimons (1942, in letter) who says that "the reduction in pores has taken place distally, where there are 3-4 enlarged poreless scales continuous with those bearing pores."

the Senckenberg Museum (No. 4192.2a), which Mertens (1922a) refutes.

In referring Zanzibar geckos to *laticauda*, I (1920a, *et seq.*) was in error, having accepted Tornier's (1900b) conclusions and for several years overlooked his subsequent (1902b) retraction. Even then, in the hope that they might prove to be subspecifically related, I continued to use the name *laticauda* while awaiting an opportunity to revise the genus. Parker (1940) recently pointed out my error and now, after careful comparison of Zanzibar, Bagamoyo, and Dar es Salaam material with a series of *dubia* from Madagascar, I entirely fail to find any difference between them, beyond, perhaps an average in size.

Breeding. Presumably the pair of eggs are deposited in the crowns of coconut palms, for the lowest eggshells which I have found were at a height of six feet from the ground.

Diet. Ants and beetles.

Parasites. Red acarine parasites are sometimes present about anus.

Enemies. One was recovered from the stomach of a tiger snake (*Tarbophis s. semiannulatus*) at Bagamoyo.

Habitat. In East Africa, owing to its dwelling in the crowns of coconut palms, this gecko is exceedingly difficult to obtain. The first specimens which I secured were taken while passing through a street in the native quarter of Dar es Salaam. Overhead some thatchers were cutting fronds and dropping them into the road. Even then, one of the geckos made a dash for the nearby trunk of a palm which it ascended to safety. Occasionally one encounters these beautiful geckos on the ground, presumably *en route* from one palm to another.

In Madagascar, according to Boettger (1913), this species is found upon the satra palms, whereas *madagascariensis*, though inhabiting the same localities, dwells among the mangroves.

Localities. **Madagascar**¹: Kandrary (Kandani); Majunga; Makamby Island; Maroamalona; St. Augustin; Soalala. **Comoro Islands**: Anjouan (Johanna) Id.; Grand Comoro Id.²; Mayotte Id.; Moheli Id. **Zanzibar Island, Tanganyika Territory**: Bagamoyo; Dar es Salaam; Singino; Zungomero.

Range. Northwest Madagascar¹; Comoro Islands; Zanzibar Island; and adjacent coast of Tanganyika Territory.

¹ The only record from eastern Madagascar for *dubia* is that of Angel (1936c) for a young gecko from Anovoka (Tsianovoka). I have omitted this as questionable and as the point cannot be cleared up at the present time by an examination of the specimen in question, have tentatively referred the reference to *lineata*, a species which has been recorded from Anovoka by Boettger (1913).

² A possible explanation of the occurrence of both the typical form and the race *comorensis* on this island may be found that the latter is at present known only from above 3000 feet.

PHELSUMA DUBIA COMORENSIS Boettger

1913. *Phelesumia laticauda* var. *comorensis* Boettger, in Voeltzkow, Reise in Ostafrika, 3, p. 336: La Grille, circa 1000 metres, Grand Comoro Island.
1917. Voeltzkow, p. 460.
- 1929d. Barbour & Loveridge, p. 314.
- 1939a. Rendahl, p. 269.

Description. Snout 1.5 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about three-quarters that of the former; rostral *without* median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1 granule (in all 23 cotypes); upper labials 7-9; lower labials 6-8; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with *smooth* granules; ventral scales smooth; males with 12-17¹ preano-femoral pores forming an uninterrupted series; about 15-16 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth, imbricate, subuniform scales.

Coloration. Above, olive green, greenish or violet gray; a light streak from nostril to eye; a \cap -shaped mark in frontal region; a semicircular patch on occiput, all three light markings showing a tendency to coalesce; back with, or without, a light, irregular, vertebral line (sometimes disintegrating) flanked posteriorly by a series of light irregular blotches which tend to coalesce; sometimes a broad, dark line along flank from eye to base of tail sharply defining the dorsal coloring from the ventral. Below, whitish, immaculate, or a dusky, violet \cap -shaped mark following contour of lower jaw to insertion of fore arm, sometimes extending on along the flank, thereby separating a light lateral line, to hind limb; tail immaculate or flecked with darker.

Measurements. Total length of cotype ♀, 85 + (50 + 35 +) mm. (M.C.Z. 21954).

Remarks. The above description is based solely on three female cotypes in the Museum of Comparative Zoölogy together with data culled from the original description of the twenty-three cotypes.

Boettger made *comorensis* a race of *laticauda* on account of its agreeing with that species in its rostral being without a median cleft

¹ Perhaps Boettger intended to qualify this by saying 'on either side,' in that event 24-34 would seem to be extremely high.

and the uppermost nasal being separated from its fellow by a single granule, he disregarded the more important character of its subuniform subcaudals as contrasted with those of *laticauda* in which those of the median series are transversely enlarged. To me its derivation from *dubia* seems obvious. We are, however, faced with the fact that both forms occur on Grand Comoro and can only speculate that while *dubia* is restricted to the lowlands, *comorensis* is a montane race.

PHELSUMA V-NIGRA Boettger

1913. *Phelsumia v-nigra* Boettger, in Voeltzkow, Reise in Ostafrika, **3**, pp. 337, 339, 341, 343, pl. xxv, fig. 9: Moheli Island, Comoro Islands.
 1917. Voeltzkow, p. 460.
 1929d. Barbour & Loveridge, p. 314.
 1939a. Rendahl, p. 267.

Description. Snout 1.5 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral without median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1 granule; upper labials 7-8; lower labials 6-8; chin region covered with enlarged tile-like, flat scales of which the outer are slightly larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; males with 20-28 preano-femoral pores forming an uninterrupted series; about 15-19 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the two median series are irregularly and slightly enlarged.

Coloration. Above, purplish brown (blue green in life), uniform or flecked with lighter gray green or gray brown, head with from one to seven flecks; tail vermiculated with black. Below, whitish (citron yellow), a dusky \cap -shaped mark following contour of lower jaw; throat uniform or with a second dark, chevron-like mark.

Measurements. Total length of cotype ♂, 95 (45 + 50) mm. (A.M.N.H. 24772); of cotype ♀, 94+ (46 + 48 +) mm., tail regenerating (M.C.Z. 17844); both from Moheli Island, which, it may be noted, is the type locality, *not* Grand Comoro Island.

Remarks. In scale counts indistinguishable from *P. d. comorensis* of La Grille Mountain, Grand Comoro, but very different in chin shields and coloration. In the latter character it reveals affinities

with *P. m. abbotti* of Aldabra Island, displaying the dusky gular chevron so frequently present in members of the *madagascariensis* group, though it differs from them in having the two median rows of subcaudals subequal or but slightly enlarged. Boettger observes that the chin shields of *v-nigra* are more numerous than in *madagascariensis*.

Localities. **Comoro Islands:** Anjouan (Johanna) Id.; Mayotte Id.; Moheli Id.; and Mt. Msotzo, circa 300 metres, Grand Comoro Id.

Range. Comoro Islands.

PHELSUMA MADAGASCARIENSIS ABBOTTI Stejneger

1893b. *Phelsuma abbotti* Stejneger, Proc. U. S. Nat. Mus., **16**, p. 716: Aldabra Island.

1893. Abbott, p. 762.

1939a. Rendahl, p. 266.

1909h. *Phelsuma madagascariense* Boulenger (part), p. 297 (Aldabra).

1911d. *Phelsuma madagascariense* var. *abbotti* Boulenger, p. 378.

1913. Boettger, p. 333.

Description. Snout 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter not half that of the former; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-3 granules; upper labials 7-8; lower labials 7-7; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with keeled granules; ventral scales smooth; males with 33-34 preano-femoral pores forming an uninterrupted series; about 18 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is strongly transversely enlarged.

Coloration. Above, dark brown or olive slate; a dark streak from nostril through eye to above ear-opening; back, on each side of vertebral line, purplish; flanks and upper surface of limbs marbled with blackish; tail purplish. Below, whitish, a dusky \cap -shaped mark following contour of lower jaw; throat with a second chevron-like mark.

Measurements. Total length of type ♂, 127 (57 + 70) mm., of a topotype ♀, 106 + (49 + 57 +) mm. (M.C.Z. 22611).

Remarks. Boettger (1913), comparing typical *madagascariensis* with a series of *abbotti* states that the latter is consistently smaller,

that its snout *averages* somewhat shorter, that the ear-opening is *usually* smaller, and that the chin shields are more sharply differentiated from the gular granules. He adds that in scalation, coloration, and markings—particularly those on the throat—the similarities are amazing.

With only a single specimen I can offer no opinion, apparent differences in the description, however, may be ascribed to the paucity of material, little being added to the original description.

Habitat. Common on the walls of houses (Voeltzkow).

Localities. **Aldabra Id.:** Malabar; Picard; Takamaka. **Assumption Id.**

Range. Aldabra Islands.

PHELSUMA MADAGASCARIENSIS LONGINSULAE Rendahl

1869a. *Pachydactylus cepedianus* Peters (part, none of Merrem), p. 13.

1877b. Peters (part), p. 455.

1885d. *Phelsuma madagascariense* Boulenger (part), p. 214.

1909h. Boulenger (part), p. 297.

1911d. Boulenger, p. 377.

1936b. Parker, p. 446.

1939a. *Phelsuma longinsulæ* Rendahl, Zool. Jahrb. Syst., **72**, p. 279: Long Island, Seychelle Islands.

1939a. *Phelsuma pulchrum* Rendahl, Zool. Jahrb. Syst., **72**, pp. 280, 320: Mahe Island, Seychelle Islands.

1939a. *Phelsuma pulchrum cousinense* Rendahl, Zool. Jahrb. Syst., **72**, pp. 281, 283, fig. 6: Cousin Island, Seychelle Islands.

Description. Snout 1.7 to 2¹ times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about three-quarters that of the former; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals; the uppermost separated from its fellow by 1-3 granules; upper labials 9-11; lower labials 7-9; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; males with 28-35 preano-femoral pores forming an uninterrupted series; about 17-18 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is strongly transversely enlarged.

¹ Apparently to 2.2 times in *cousinense*.

Coloration. Above, purplish (green in life) variegated with lighter (orange red), viz.:—an orange streak from nostril to eye; a α -shaped mark in frontal region; back with a vertebral line flanked by more or less coalescing spots; flanks with, or without, another series; limbs variegated with lighter; tail spotted or cross-banded with lighter. Below, whitish, a violet α -shaped mark following contour of lower jaw; throat (yellowish green in life) with, or without, dusky flecking; end of tail sometimes greenish.

Measurements. Total length of largest cotype of *longinsulae*, 141 (65 + 76) mm.; of *pulchra*, 141 (63 + 78) mm.; of *cousinense*, head and body only, as tail missing, 65 mm.

Total length of σ , 132 (62 + 70) mm.; of φ , 102 (45 + 57) mm. (Both M.C.Z. 3086).

Remarks. No characters or key for distinguishing the three forms named by Rendahl are furnished by that author, on the contrary the overlap of every character for which he furnishes data apparently precludes the recognition of *pulchrum* and *cousinense*.

Habitat. From 800 to 1400 feet (Boulenger).

Localities. **Seychelle and Amirante Islands:** Bird Id.; Cousin Id.; D'Arros Id.; Dennis Id.; Frigate Id.; Long Id.; Mahe Id.—Bel Air, Cascade, Cascade Estate, Chateau Margot, Port Victoria, Sans Souci; Marie Louise Id.; Morne Id.; Praslin Id., Silhouette Id.; St. Joseph's Id.

Range. Seychelle and Amirante Islands.

PHELSUMA MADAGASCARIENSIS ANDAMANENSIS Blyth

1860. *Phelsuma andamanense* Blyth, Journ. Asiatic Soc. Bengal, **29**, p. 108: Andaman Islands.
1864. Günther, p. 112.
1868. Theobald, p. 74.
1870. Stoliczka, p. 162.
1871. Anderson, p. 160.
1873. Stoliczka, p. 163.
1874. Theobald, p. 74.
- 1885d. Boulenger, p. 212.
1890. Boulenger, p. 106.
1904. Annandale, p. 14.
1935. Smith, M. A., p. 121, fig. 35.
1864. *Gecko chameleon* Tytler, Journ. Asiatic Soc. Bengal, **33**, p. 548: Andaman Islands.

Description. Snout 1.7 to 2 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about a

quarter¹ to a half that of the former; rostral with median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 2-3 granules; upper labials 8-11; lower labials 6-10; chin region covered with enlarged scales of which the outer are slightly larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; males with 24-32 preano-femoral pores forming an uninterrupted series; about 15-16 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is strongly transversely enlarged.

Coloration. Above, greenish (rich emerald green in life), uniform or spotted with reddish or yellowish orange; an orange streak from nostril through eye to ear; an orange \cap -shaped marking in frontal region present or absent; one or two orange streaks on neck; back anteriorly with a vertebral line; tail uniformly green or blue. Below, whitish (bright yellow in life), immaculate. Tongue bright red. In the dark the bright colors and markings disappear (Tytler).

Measurements. Total length of ♂, 126 (50 + 76) mm.; of ♀, 100 (50 + 50) mm. (M.C.Z. 7148), but both exceeded by an unsexed record of 136 (63 + 73) mm. furnished by M. A. Smith (1935).

Remarks. Boulenger (1885d) places this species in the section of his key in which the centre of the nostril is above the rostro-labial suture, this is not the case, however, with Malcolm Smith's (1935) figure nor yet in our topotype (M.C.Z. 7148). Is it possible that two superficially similar species occur on the islands?

Habits. Diurnal and arboreal, hiding beneath bark of trees, but also found in houses and frequently feeding on the ground (Stoliczka).

Localities. **Andaman Islands:** Port Blair.

Range. Andaman Islands.

PHELSUMA MADAGASCARIENSIS PARKERI Loveridge

1913. *Phelsumia madagascariensis* Boettger (not Gray), p. 350.

1941. *Phelsumia madagascariense* ? subsp. Moreau & Pakenham, 1940, p. 107.

1941. *Phelsumia madagascariensis parkeri* Loveridge, Proc. Biol. Soc. Washington, **54**, p. 175: Kinowe, Pemba Island.

Description. Snout 1.6 to 2 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter three-

¹ Quarter *vide* Boulenger.

quarters of, or equal to, that of the former; rostral without, rarely with, median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1-2 granules; upper labials 8-10; lower labials 7-9; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with smooth granules; ventral scales smooth; males with 32-38 preano-femoral pores forming an uninterrupted series; about 16-17 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is strongly transversely enlarged.

Coloration. Above, bluish gray (green in life) finely vermiculate with black on back and limbs; tail paler, uniform. Below, whitish, immaculate, even on throat.

Measurements. Total length of a paratype ♂, 148 + (65 + 83 +) mm., the tail in process of regeneration; total length of type ♀, 148 (65 + 83) mm.

Remarks. The foregoing description is based almost exclusively on the type series of seven specimens in the Museum of Comparative Zoölogy, collected by Mr. R. H. W. Pakenham.

Breeding. On December 3, the type ♀ held two ova, each measuring about 13 x 8 mm.

Habitat. Coconut palms.

Localities. **Pemba Island:** Kinasini; Kinowe; Wete.

Range. Pemba Island.

PHELSUMA MADAGASCARIENSIS MADAGASCARIENSIS Gray

1836. *Platydictylus Cepedianus* Duméril & Bibron (part), p. 301.
 1851. Duméril, p. 34.
 1845. *Phelesuma madagascariensis*¹ Gray, Cat. Lizards Brit. Mus., p. 166: Madagascar.
 1885d. Boulenger (part), p. 214 (omit Seychelles and Zungomero).
 1887a. Boulenger, p. 490.
 1887. Strauch, p. 18.
 1893a. Boettger, p. 37.
 1903b. Ferreira, p. 21.
 1909. Mocquard, pp. 19, 93.
 1910a. Andersson, p. 8.
 1911. Lampe, p. 157.
 1913. Boettger, pp. 291, 321, 327 (not 350).
 1913a. Methuen & Hewitt, p. 187.
 1915. Rawitz, p. 618, pl. xlii, fig. 22.
 1917. Voeltzkow, p. 460.
 1922. Kaudern, p. 418.
 1925b. Flower, p. 941.
 1931. Angel, p. 514.
 1933b. Mertens, p. 265.
 1939a. Rendahl, pp. 264, 266, fig. B.
 1870a. *Phelesuma grandis* Gray, Ann. Mag. Nat. Hist. (4), 6, p. 191: Madagascar.
 1909. Mocquard, p. 94.
 1881e. *Pachydactylus Cepedianus* var. *madagascariensis* Boettger, p. 458, pl. ii, fig. 5.
 1881c. *Pachydactylus grandis* Boettger, p. 530.
 1884b. *Pachdactylus cepedianus* Fischer (not Cuvier), p. 33.

Further citations of '*madagascariensis*' will be found under its various races, also under *d. dubia*, and *mutabilis*.

Description. Snout 1.6 to 2² times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half³ to two-thirds that of the former; rostral with, rarely without, a median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 1 granule; upper labials 7-10; lower labials 6-9; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gulars.

Back covered with granules (smooth in young, keeled laterally and

¹ Some of the references following are to *madagascariense*.

² Apparently 2.3 *vide* Rendahl.

³ Not half *vide* Boulenger (1885d).

in pelvic region in old); ventral scales smooth; males with 34-50 preano-femoral pores forming an uninterrupted series; about 16-19 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is strongly transversely enlarged.

Coloration. Above, greenish, blue gray, plumbeous, or purplish, sometimes uniform, more often marked as follows: an orange streak from nostril to eye but going no further; an orange spot or spots, which may take a \cap -shaped form, in frontal region; a few irregular pale spots on either side of back or only posteriorly in lumbar region. Below, whitish or greenish, throat uniform or with dusky vermiculations often taking the form of a series of indistinct, \cap -shaped markings; tail uniform. Iris bluish or grayish.

Measurements. Total length of ♂, 259 (117 + 142) mm., but tail regenerated, from S.W. of Mt. d'Ambre; total length of ♀, 212 (118 + 94) mm. (Boettger).

Remarks. It must be borne in mind that young males of all species are apt to have fewer pores than those assigned to the species, and in giant species like *madagascariensis* the fact that they are young may consequently be overlooked. Young specimens of *madagascariensis* are likely to be confused with *laticauda* which occurs in the same localities, but whose tail is much vermiculate above and whose females breed at a length of 40 mm. from snout to anus. Boettger states that in *madagascariensis* the caudal scales *above* are arranged in whorls consisting of 5-6 scales, whereas in sixty cotypes of *laticauda* there were 8-10, average 9, scales to a whorl, other writers have claimed 7 scales for both species, the limited material at my disposal supported Boettger.

Anatomy. The nervous system is discussed by Rawitz (1915).

Longevity. Flower records one as living for a year and a quarter, but mentions that a Vienna correspondent claimed to have kept one for over three years.

Habits. Common in woods, but also found in houses (Kaudern).

Localities. Madagascar: Ambila (Ambilo); Ambongo; Andranolava; Anjamala (Ianzamaly) near Tulear¹, Angurutani; Col Pierre Radama; Fandarazana; Kandranj (Kandani); Majunga; Mt. d'Ambre—S.W. of; Nosy Be; Nosy Sakatia; Ste. Marie Id.; Ste. Marie de Marovoay; Sakana; Soalala; Tamatave²; Tampina.

¹ This young specimen, being the only southwestern record, should be reexamined.

² *Fide* Boulenger (1887a) ex. Cowan coll.

Range. Madagascar (chiefly northern) and adjacent islands. Recorded also from Quilimane, Mozambique (Boulenger, 1885d).

PHELSUMA LATICAUDA (Boettger)

- 1869a. *Pachydactylus cepedianus* Peters (part), p. 13.
 1873c. Peters, p. 792.
 1879b. Boettger, p. 480.
 1880b. Peters, p. 510.
 1880a. *Pachydactylus laticauda* Boettger (part), Zool. Anz., **3**, p. 280: Nosy Be, Northwest Madagascar (omit Tamatave).
 1880b. Peters, p. 510.
 1881c. Boettger (part), pp. 461, 530, pl. ii, fig. 6.
 1885d. Müller, p. 709.
 1885d. *Phelsuma laticauda* Boulenger, p. 215.
 1887. Strauch, p. 18.
 1890a. Müller, p. 290.
 1893a. Boettger (part), p. 39.
 1903b. Ferreira, p. 21.
 1909h. Boulenger, p. 297.
 1909. Mocquard, pp. 19, 88.
 1913. Boettger, pp. 339, 342 (as *Phelsumia*).
 1915. Rawitz, p. 613, pl. xlii, figs. 18-21.
 1917. Voeltzkow, p. 460.
 1939a. Rendahl, p. 269.
 1929d. *Phelsuma laticauda laticauda* Barbour & Loveridge, pp. 312, 314.

Further citations of '*laticauda*' will be found under *d. dubia*, *lineata* and *breviceps*.

Description. Snout 1.3 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about two-thirds that of the former; rostral without, rarely with, a median cleft above; centre of nostril above first labial; nostril between first labial (sometimes excluded) and 3 nasals; the uppermost separated from its fellow by 1 granule; upper labials 6-9; lower labials 6-9; chin region covered with enlarged scales of which the outer are much larger than the inner, the latter posteriorly merging into the gular granules.

Back covered with smooth granules; ventral scales smooth; males with 24-28 preano-femoral pores forming an uninterrupted series; about 16-18 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is slightly transversely enlarged.

Coloration. Above, purplish gray to olive green (bright green in life); head with two broad, transverse, light (reddish orange) crossbars on snout and a third on occiput; back uniform anteriorly but lumbar region with light (brick red) irregular, more or less coalescing, blotches; on flanks, at least from axilla to groin, a dark lateral band (or two narrower lines very close together) present or absent; limbs and tail characteristically vermiculate with short dark lines; tip of tail sometimes bluish. Below, whitish (hinder part of throat and whole of tail with transverse patches of bright yellow). Irish violet red.

Measurements. Total length of largest cotype, 120 (56 + 64) mm., probably a ♂; largest ♀, 104 (50 + 54) mm. from Anjouan Id. (A.M.N.H. 24783).

Remarks. Boettger (1880a, 1881c, 1893a), in his description of *laticauda*, included two young geckos from Tamatave, which differed from his 77 cotypes from Nosy Be in their round tails and blue-violet ground color with the dark lateral stripes extending forwards to the snout. I have little doubt that these Tamatave specimens were young *lineata*, a species with which Boettger wrongly supposed his *laticauda* might eventually be synonymized. The specimens from Didy, near Tamatave, recorded by Barbour (1918) have been examined and transferred to *lineata*.

Mocquard's (1902a) record of *laticauda* from Fort Dauphin is tentatively referred to *breviceps*, which was subsequently recorded from there by Boettger (1913). Unless introduced, it seems improbable that this northwestern species should occur in the extreme southeast. I am also somewhat doubtful regarding Methuen and Hewitt's (1913a) specimens from the southwest.

It must, I suppose, be considered an open question as to whether *laticauda* occurs on Zanzibar. The data of Tornier's (1900b, p. 588) specimens Nos. 2, 3, and 4 of the Werth collection, as supplied by Tornier, actually agree with *laticauda*, while Nos. 1 and 5 are indubitably *d. dubia*. A re-examination of my Zanzibar material, once referred to *laticauda* as being the older name, shows that they are all *d. dubia* as now understood. The question can be settled only by an inspection of Tornier's geckos Nos. 2, 3, and 4 to see whether the dorsal granules are not obtusely keeled.

P. dubia, it might be added, does not have the subcaudals transversely enlarged, and *P. laticauda* is much more likely to be mistaken for a young *madagascariensis* which, however, has a uniformly colored tail.

Anatomy. The nervous system is discussed by Rawitz (1915).

Localities. **Comoro Islands:** Anjouan Id.; Farquhar Id.; Mayotte Id. **Madagascar:** Nosy (Nossi) Be; Nosy Faly. West Madagascar (*fdde* Methuen and Hewitt).

I have seen a specimen from Anjouan (Amer. Mus. Nat. Hist. coll.); the Farquhar record (Boulenger, 1919h) requires confirmation as *madagascariensis* also occurs; regarding the Mayotte specimens Boettger (1913) says quite definitely that they are not *comorensis*, which one would have expected them to be.

Range. Islands of northwest Madagascar and Comoro; reported from western Madagascar by Methuen & Hewitt.

PHELSUMA GUTTATA Kaudern

1922. *Phelsuma guttata* Kaudern, Zool. Jahrb. Syst., p. 418, pl. xii, figs 1-1a:
Fandrarazana, Northern Madagascar.
1933b. Mertens, p. 265.
1939a. Rendahl, p. 268.

Description. Snout 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about half that of the former; rostral without a median cleft above; centre of nostril above first labial; nostril between first labial and 3 nasals, the uppermost separated from its fellow by 2 granules; upper labials 8-11; lower labials 6-9; chin region covered with 6-10 enlarged scales surrounding a group of much smaller scales and followed also by smaller scales which posteriorly merge into the gular granules.

Back covered with smooth granules; ventral scales smooth; male unknown; tail, when unregenerate or regenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series is transversely enlarged.

Coloration. Above, dark violet; snout flecked with lighter; a dark streak from nostril through eye to neck above ear-opening, a less conspicuous wavy streak from angle of mouth to neck, below, but parallel with it is a third coming from chin, a fourth, coming from throat, also extends on to side of neck, an ill-defined fifth, reaching to base of fore arm, may also be present; back flecked with black and white; flanks with two or three rows of white flecks some of which fuse to form a light line above the hind limb; limbs with large white spots. Below, whitish, chin and throat with three chevron-shaped markings whose arms continue on to sides of neck; belly uniform; tail flecked with violet.

Measurements. Total length of ♀, 120 (52 + 68) mm., from Col Pierre Radama; the holotype ♀ was only 102 (56.5 + 45.5) mm.

Breeding. The larger ♀ held big eggs (Mertens).

Remarks. This species is known to me only from the figures and descriptions of the four known females.

Localities. **Madagascar:** Col Pierre Radama; Fandarazana.

Range. Northern Madagascar.

PHELSUMA MUTABILIS (Grandidier)

1869. *Platydyctylus mutabilis* Grandidier, Rev. Mag. Zool. (2), **21**, p. 341: Fierin and Menabe (Menaba), western Madagascar.
- 1881c. *Peripia mutabilis* Boettger, p. 531.
- 1895a. *Phelsuma madagascariense* Mocquard (not Gray), p. 94.
- 1901b. *Phelsuma androyense* Mocquard, Bull. Mus. Paris, **7**, p. 252: North Androy, Magagascar.
- 1902a. *Phelsuma mutabilis* Mocquard, p. 10.
1909. Mocquard, pp. 19, 93.
- 1913a. Methuen & Hewitt, p. 186.
- 1925b. Angel, p. 60.
- 1931d. Angel, p. 514.
- 1934a. Angel, p. 312.
- 1939a. Rendahl, p. 268.
1913. *Phelsumia (sic) micropholis* Boettger, in Voeltzkow, Reise in Ostafrika, **3**, p. 293, pl. xxiv, figs. 6-7: Menabe and Manampetsa (Tsimanampetso), southwestern Madagascar.
1922. Kaudern, pp. 418, 457.
- 1925b. Angel, p. 60.
- 1931d. Angel, p. 515.
- 1933b. Mertens, p. 265.
- 1935d. Angel, p. 470.
- 1939a. Rendahl, p. 266.

Description. Snout 1.3 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about two-thirds that of the former; rostral with, rarely without¹, a median cleft above; centre of nostril above first labial; nostril between first labial and 2-3 nasals, the uppermost separated from its fellow by 1-3 granules; upper labials 6-8; lower labials 5-6; chin region covered with enlarged scales of which the outer three or four pairs are much larger than the inner, the latter posteriorly merging into the gulars.

¹Specimens with and without median cleft present in Boettger's type series of *micropholis* from both type localities.

Back covered with smooth granules; ventral scales smooth; males with (?24¹) 27–32 preano-femoral pores forming an uninterrupted series; about 10–12 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales; below with smooth, imbricate scales of which the median series is both slightly and strongly transversely enlarged, one strongly dilated alternating with two slightly dilated.

Coloration. Above, pale brown; a dark brown streak from nostril through eye to neck above ear-opening; two narrower brown lines on snout merge on occiput and continue to nape where other irregular lines may be present; back blotched, flecked, or variegated with darker, such markings taking the form of cross-bars on limbs and streaks on tail. Below, whitish, immaculate except for a dark n-shaped mark following the contour of the lower jaw.

Measurements. Total length of ♂, 96 (44 + 52) mm., from Manampetsa, of ♀, 102 (49 + 53) mm., from Manabe.

Remarks. Mocquard (1895a) referred Grandidier's five cotypes of *mutabilis* to the synonymy of *madagascariensis*. Later (1902a) he not only recognized its validity but referred his own recently-described *androyense* to the synonymy. After an examination of an extensive series of *micropholis*, including the cotypes in the Museum of Comparative Zoölogy, I have no hesitation in adding it to the synonymy also.

I am not so certain that what Angel (1925b, 1931d) called *micropholis* belongs here, however. His specimen, a ♀, from Tzivono, north of Tulcar, is said to have the nostril in contact with the rostral whereas the numerous paratypes of *micropholis*, as pointed out by Mertens (1933b), are constant in having the nostril separated from the rostral.

Localities. **Madagascar:** Ampanihy; Andranohinaly; Andranolaho; Andringitra Mtns.; Androy—north; Col Pierre Radama; Fierin²; Mevatanana; Manampetsa (Tsimanampetso); Manasoa; Maroamalona; Menabe (Menaba); Ste. Marie de Marovoay; Tanosy; Tongobory; Tsvonoina; Tulcar.

The majority of these are in the southwest so that Mertens (1933b) record of Col Pierre Radama from the northeast is somewhat surprising though doubtless correct for he compared his series with the types of *micropholis*.

Range. Madagascar.

¹ See 'Remarks.'

² Fierin (Grandidier, 1869) is probably *Firinga* (Grandidier's map, 1925).

PHELSUMA BREVICEPS Boettger

- 1894b. *Phelsuma breviceps* Boettger, Zool. Anz., **17**, p. 137: Southern Madagascar.
1898c. Boulenger, p. 914.
1909. Mocquard, pp. 19, 89.
1913. Boettger, p. 292 (as *Phelsumia*).
1934a. Angel, p. 312.
1935d. Angel, p. 470.
1939a. Rendahl, p. 267.
1902a. ?*Phelsuma laticauda* Mocquard (? not Boettger), p. 10.

Description. Snout 1.3 to 1.6 times as long as the distance between the eye and the ear-opening, vertical diameter of the latter about two-thirds that of the former; rostral without a median cleft above; centre of nostril above first labial; nostril between first labial and 2 nasals, the uppermost separated from its fellow by 1 granule; upper labials 6-7; lower labials 5-6; chin region covered by two pairs of very large postmentals which are sharply distinct from the gular granules following them.

Back covered with smooth granules; ventral scales smooth; males with 27-31 preano-femoral pores forming an uninterrupted series; about 11 transverse lamellae beneath fourth toe anteriorly; tail, when unregenerate, covered above with smooth scales, below with smooth imbricate scales of which the median series (at least in a regenerated tail) is transversely enlarged.

Coloration. Above, olive gray, uniform or variegated with dark brown; a dark brown streak, bordered below by a lighter one, from nostril through eye to above ear-opening. Below, chin and throat yellowish spotted with brown; belly and tail whitish, the latter spotted with brown.

Measurements. Total length of ♂, 107 (48 + 59) mm., of ♀, 73 + (45 + 28+) mm., both from Manampetsa. The holotype ♂ also had a head and body length of 48 mm. but his tail was regenerated.

Localities. **Madagascar:** Andranovaho; Fort Dauphin; Manampetsa (Manampetso; Tsimanampetso).

Range. Southern Madagascar.

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Titles are omitted for sake of brevity

* An asterisk signifies the oriental *P. m. andamanensis* only dealt with

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